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## CARDIORENAL SYNDROME IN PATIENTS WITH EARLY STAGES OF CHRONIC HEART FAILURE

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**Abstract.** The kidneys, being an organ involved in important metabolic processes, regulation of the humoral system, and microcirculation processes, are subject to acute and chronic effects in various cardiovascular diseases (CVD) and affect the formation and progression of cardiovascular pathology. The aim of this study was to study the current scientific literature dedicated to approaches to early diagnosis, treatment and prevention of cardiorenal syndrome

**Keywords:** cardiorenal syndrome, kidney, nephropathy, complication

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Over the past 10 years, the problem of a "double epidemic" of heart and kidney failure has been increasingly discussed [2,3], since many patients simultaneously have manifestations of these two clinical conditions, which has led to a wide spread the concept of "cardiorenal syndrome" [4, 19].

The term cardiorenal relationships was first proposed in 2008 in Venice at the International Conference on Cardiorenal Relationships. ADQI conferences. The frequency of combined kidney and heart damage is very high huge. Renal dysfunction determines high cardiac morbidity and mortality even with an initial decrease in renal function. Cardiac pathology is 64% higher in patients with impaired renal function than in healthy subjects [1]. Cardiorenal syndrome (CRS) is currently a multidisciplinary problem. a problem that requires the efforts of clinicians of different specialties. Study of the causes and mechanisms of formation of cattle types, early detection of bio-markers of damage and risk factors will help determine the best methods of correction of cattle in order to improve survival and improve the quality of life of patients. Clinicians' understanding клиницистами of the complex relationship between cardiac and renal dysfunction, the mechanisms of the formation of cattle, and the application of this knowledge in practice will contribute to improving the diagnosis, timely treatment and prevention of severe complications of cardiovascular and renal pathology and preventing their progression [5,7].

**The aim of this study** was to study the current scientific literature on approaches to early diagnosis, treatment and prevention of cardiorenal syndrome. The mechanisms of cattle development are multifactorial and need to be clarified. KRS occurs already in the early stages of renal dysfunction, and along with general population risk factors, the influence of factors associated with kidney damage was significant for its development .

It is the cardiac pathology that determines the significant risk in chronic kidney disease

(CKD). Cardiac complications develop more frequently than terminal chronic renal failure (CRF) [8-11]. According to the NHANES II Study, in patients with CKD, the prevalence of cardiovascular diseases (CVD) increases as the glomerular filtration rate (GFR) decreases. As CKD progresses, left ventricular hypertrophy (LVH), systolic and/or diastolic dysfunctions, atherosclerosis, and vascular calcification develop [9, 10]. In end-stage CKD, signs of heart failure are detected in 40% of cases, and changes in the left ventricle of the heart are detected in 85% of cases [5]. This category of patients often has ischemic heart disease (CHD) and arterial hypertension (AH) [12]. According to the ARIC study, in patients with stage 2 CKD, new cardiac complications account for 4.8%, and in patients with stages 3-4 CKD, their frequency almost doubles [10]. A large number of studies have shown a link between reduced GFR.

Cardiorenal syndrome (CRS) is a syndrome of activation of common mechanisms of pathogenesis of heart and kidney damage. Cattle are characterized by bidirectionality, when the dysfunction of one of the organs is caused by acute or chronic damage to the other [13]. There are five types of cattle:

Type 1 – acute cardiac disorders that contribute to kidney damage or dysfunction (AKI).

Type 2-CHF that contributes to impaired kidney function or damage (CKD).

Type 3-AKI that leads to acute cardiac injury and / or impairment heart function (OSN, arrhythmia).

Type 4 – CKD, which leads to worsening of heart function, formation of hypertrophy left ventricular failure (LVH), increased cardiac risk.

Type 5-systemic diseases (sepsis, DM) that lead to a simultaneous violation of the heart and kidney function.

There are two important aspects in the development of any type of cattle: the first is the sequence of organ involvement, and the second is the bi-directionality of action leading to a vicious circle. These disorders are limited in time (chronic or acute) [14,18]. The development of cattle is associated with the action of pathological factors that negatively affect the function of the myocardium and kidneys. Genetic, metabolic, hemodynamic, neurohumoral factors, and disorders of mineral and lipid metabolism are involved in the development of this syndrome [15, 16].

Predispose to cattle: hypertension, metabolic syndrome, dyslipidemia, anemia, diabetes, CHD,

renovascular and parenchymal kidney diseases [20]. Cattle include the following

pathogenetic mechanisms: 1) impaired cardiac pump function (decreased cardiac output, increased venous pressure); 2) oxidative stress of cells, pathological

endothelial damage, immune response, inflammation, apoptosis; 3) neuroendocrine activation (RAAS, sympathetic nervous system-SNS, vasopressin); 4) disruption of water and electrolyte balance, accumulation of uremic toxins [17, 19]. With the development of renal and cardiac dysfunction, RAAS and SNS are activated, endothelial dysfunction and chronic systemic inflammation develop. These pathophysiological mechanisms act simultaneously and consistently, forming a vicious circle leading to accelerated fibrosis and dysfunction of the heart and kidneys: remodeling of the myocardium, vascular wall, and renal tissue [13,20,22].

The kidneys, being an organ involved in important metabolic processes, regulation of

humoral system, microcirculation processes, are subject to acute and chronic effects of various cardiovascular diseases (CVD) and affect the formation and progression of cardiovascular pathology. Renal dysfunction is associated with a higher incidence of recurrent myocardial ischemia, myocardial infarction (MI), stroke, serious hemorrhagic complications, acute heart failure, and atrial and ventricular fibrillation. Even a small decrease in renal function significantly worsens the course of the underlying cardiac pathology, while increasing the frequency of complications and the risk of death, and, conversely, a decrease in myocardial contractility affects the kidneys in the most negative way. The need for early detection of kidney damage in cardiovascular diseases to assess the risk, develop strategies and tactics for managing patients contributed to the emergence of such concepts as "cardiorenal anemia syndrome" (2003) and "cardiorenal continuum" (2005). Pathogenesis of early-stage cardiovascular complications

renal dysfunction, in the case of "classic" CKD and DM – is different. If with CKD the determining factor is a decrease in the mass of active nephrons, accompanied by a violation of depuration functions of the kidneys with the accumulation of metabolic products [6, 21]. In DM, the leading role belongs to a violation of metabolism initiated by hyperglycemia, leading to hyperfiltration and intraglomerular hypertension, the appearance of albumin/proteinuria with a gradual decrease in GFR and loss of renal functions [20]. Early diagnosis of disease allows you to start the necessary treatment in a timely manner, prevent the development of complications and reduce mortality, and sometimes prevent the development of severe cardiorenal pathology. Numerous biochemical markers that can be used for the diagnosis of disease are currently known and characterized as accurate, highly reliable and specific indicators of heart and kidney damage.

## **Conclusion**

Thus, cardiorenal syndrome is the development of a chronic kidney disease in patients with chronic and acute renal injury in patients with acute heart failure. Cardiorenal syndrome can be diagnosed in 32-90.3% of patients

with HF. Impaired renal function has an unfavorable prognostic value: it leads to an increase in mortality in patients with HF. It is necessary to independently diagnose the presence of b-cardiorenal syndrome and take this into account when treating patients with HF. Further research is needed on ways to prevent the development and progression of severe kidney damage in patients with heart failure, which should be addressed by a multidisciplinary team.

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